


JC10 Rec'd PCT/PTO 15 FEB 2002

FORM PTO-1390 (Modified) (REV 5-93)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				016782-0244	
INTERNATIONAL APPLICATION NO. PCT/EP00/07420		INTERNATIONAL FILING DATE 07/31/2000		U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.53) Unassigned 10/049673	
TITLE OF INVENTION DIESEL EXHAUST PARTICULATE FILTER SYSTEM		PRIORITY DATE CLAIMED 08/19/1999			
APPLICANT(S) FOR DO/EO/US Willy MARRECAU					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). <input checked="" type="checkbox"/> has been transmitted by the International Bureau. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</p> <p>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). <input type="checkbox"/> have been transmitted by the International Bureau. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>11. <input type="checkbox"/> Applicant claims small entity status under 37 CFR 1.27.</p>					
Items 12. to 17. below concern other document(s) or information included:					
<p>12. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>13. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>14. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input checked="" type="checkbox"/> Other items or information: Cover Sheet of Published Application with Abstract</p>					

U.S. APPLICATION NO. (If known, see 37 CFR 1.55) Unassigned 10/049673		INTERNATIONAL APPLICATION NO. PCT/EP00/07420		ATTORNEY'S DOCKET NUMBER 016782-0244	
18. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS	
Basic National Fee (37 CFR 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO\$890.00					
International preliminary examination fee paid to USPTO (37 CFR 1.482)\$710.00					
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2))\$740.00					
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO\$1,040.00					
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)\$100.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$890.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than 20 Months from the earliest claimed priority date (37 CFR 1.492(e))				\$130.00	
Claims	Number Filed	Included in Basic Fee	Extra Claims	Rate	
Total Claims	15	20	0	\$18.00	\$0.00
Independent Claims	1	3	0	\$84.00	\$0.00
Multiple dependent claim(s) (if applicable)				\$280.00	
TOTAL OF ABOVE CALCULATIONS =				\$1020.00	
Reduction by 1/2 for filing by small entity, if applicable.				\$0.00	
SUBTOTAL =				\$1020.00	
Processing fee of \$130.00 for furnishing English translation later the 20 months from the earliest claimed priority date (37 CFR 1.492(f)).				+	
TOTAL NATIONAL FEE =				\$1020.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +					
TOTAL FEES ENCLOSED =				\$1020.00	
				Amount to be: refunded \$	
				charged \$	
<p>a. <input checked="" type="checkbox"/> A check in the amount of \$1020.00 to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. 19-0741 in the amount of \$1020.00 to the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-0741. A duplicate copy of this sheet is enclosed.</p>					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO:					
Foley & Lardner Customer Number: 22428					
 22428					
SIGNATURE					
NAME GLENN LAW					
REGISTRATION NUMBER 34,371					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Attorney Docket No. 016782-0244

In re patent application of

Willy MARRECAU

Serial No.: Unassigned

Filed: February 15, 2002

For: DIESEL EXHAUST PARTICULATE FILTER SYSTEM

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified application, Applicant respectfully requests that the following amendments be entered into the application:

IN THE CLAIMS:

Please amend Claims 3, 4, and 6 as follows:

--3. (Amended) A method according to claim 1, wherein said membrane is a stainless steel fiber web.

4. (Amended) A method according to claim 1, said method comprising the step of providing fuel to said membrane during the regeneration period.

6. (Amended) A method according to claim 1, said method further comprising the step of:

- monitoring the pressure across said membrane during the filtration period.--

Please add new claims 9 through 15 as follows:

--9. (New) A method according to claim 2, wherein said membrane is a stainless steel fiber web.

10. (New) A method according to claim 2, said method comprising the step of

providing fuel to said membrane during the regeneration period.

11. (New) A method according to claim 3, said method comprising the step of providing fuel to said membrane during the regeneration period.

12. (New) A method according to claim 2, said method further comprising the step of:

- monitoring the pressure across said membrane during the filtration period.

13. (New) A method according to claim 3, said method further comprising the step of:

- monitoring the pressure across said membrane during the filtration period.

14. (New) A method according to claim 4, said method further comprising the step of:

- monitoring the pressure across said membrane during the filtration period.

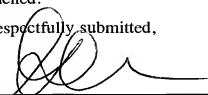
15. (New) A method according to claim 5, said method further comprising the step of:

- monitoring the pressure across said membrane during the filtration period.--

REMARKS

Applicant respectfully requests that the foregoing amendments to Claims 3, 4, and 6 and new Claims 9 through 15 be entered in order to avoid this application incurring a surcharge for the presence of one or more multiple dependent claims. A marked-up version of the claims showing the changes made is attached.

Respectfully submitted,



February 15, 2002
Date

Glenn Law
Registration No. 34,371

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VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

3. A method according to claim 1[or 2], wherein said membrane is a stainless steel fiber web.
4. A method according to [any of the preceding claims] claim 1, said method comprising the step of providing fuel to said membrane during the regeneration period.
6. A method according to [any of the preceding claims] claim 1, said method further comprising the step of:
 - monitoring the pressure across said membrane during the filtration period.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

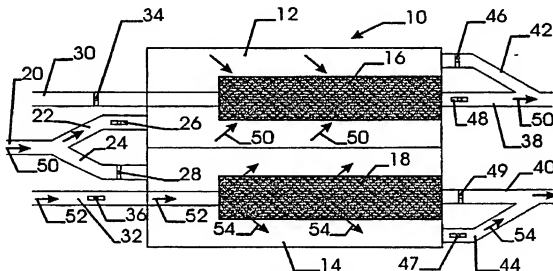
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DIESEL EXHAUST PARTICULATE FILTER SYSTEM



(57) Abstract: A method is provided for regenerating a filter of a diesel exhaust particulate filter system (10). The method comprises as steps: a) providing at least one porous membrane (16, 18); b) using said membrane (16, 18) as filter during a filtration period; c) using said membrane (16, 18) as a surface combustion burner membrane during a regeneration period.

WO 01/14696 A1

DIESEL EXHAUST PARTICULATE FILTER SYSTEM**Field of the invention.**

The present invention relates to a method of regenerating the filter or the filters of a diesel exhaust particulate filter system.

Background of the invention.

As legislation with respect to environmental issues is becoming more and more severe, diesel exhaust particulate filter systems are more and more applied in the exhaust pipes of diesel engines to trap the particulates present in the diesel exhaust gases. As particulate matter is building up on the filter membrane, pressure drop increases until a threshold is reached. The determining factor to set the threshold is to safeguard the normal functioning of the diesel engine.

Some existing filter systems allow regeneration so that they can be used again during a subsequent period. The regeneration mainly constitutes in burning the trapped particulate matter present in the filters. This regeneration can be basically done in two ways.

One way is an electrical regeneration where the filter material is heated in an electrical way until above the ignition temperature of the particulate matter. Another way is the installation of a burner which generates a flame which reaches until the filter material to burn all present particulate matter.

Both ways, however, have their respective disadvantages.

Apart from disadvantage caused by the unavoidable presence of electrical contacts and necessary electrical insulation means, the main disadvantage of the electrical regeneration system is that it involves a high degree of electrical power, which may cause substantial charge losses to the vehicle battery and which increases the consumption of fuel.

A disadvantage of the burner regeneration is that flames are generated in the exhaust pipes, which causes mechanical stresses and corrosion. Other disadvantages are that such burner regeneration systems require complex, large size and expensive combustion chambers with a high energy consumption and a high maintenance cost.

Summary of the invention.

It is an object of the present invention to avoid the disadvantages of the prior art.

- 5 It is another object of the present invention to provide an efficient, compact and inexpensive regeneration system for diesel exhaust filters. It is also an object of the present invention to provide a regeneration system for diesel exhaust filters which consumes only a low amount of energy.

- 10 According to a first aspect of the invention, there is provided a method of regenerating a filter of a diesel exhaust particulate filter system. The method comprises as steps :

- a) providing a porous membrane ;
- b) using the membrane as filter during a filtration period ;
- 15 c) using the membrane as a surface combustion burner membrane during a regeneration period which follows the filtration period.

- 20 The use of a porous membrane both as filter membrane and as surface combustion membrane makes the system very efficient, compact and inexpensive.

- According to a second and preferable aspect of the present invention, there is provided a method of regenerating a diesel exhaust particulate filter system, wherein following steps are occurring :

- 25 a) providing at least two porous membranes ;
- b) using at least one of said membranes as filter during a filtration period ;
- c) using at least one of the remaining membranes as a surface combustion burner membrane during a regeneration period
- 30 which overlaps with said filtration period.

In comparison with the embodiment of the first aspect where the regeneration period follows the filtration period, this embodiment allows regeneration to be done during the operation of the filter system.

The porous membrane can be made out of a suitable heat and corrosion resistant material such as a ceramic material or a stainless steel. Preferably the membrane is made of a stainless steel fiber web which is sintered.

5 Suitable stainless steel alloys are Fe-Cr-Al alloys.

A first group of Fe-Cr-Al based alloys comprises 15 to 25 % Cr and 4 to 6 % Al. Preferably the Al content is between 4.8 and 5.7 %.

A preferred alloy composition is an Fe-Cr-Al based alloy further comprising Y. This alloy is known as Fecralloy®.

10 The Y content ranges from 0.03 to 0.5 % and is preferably between 0.08 and 0.35 %. Most preferably the Y content is between 0.25 and 0.35 %.

Another possible alloy composition is an Fe-Cr-Al based alloy which further comprises at least one additional element selected from the group consisting of Sc, Y, Ti, Zr, Hf, V, Nb, Ta and the lanthanides, for example La or Ce. The content of the additional element or the sum of the additional elements is between 0.01 and 1%.

15 A second group of Fe-Cr-Al based alloys comprises up to 15 % Cr and 20 to 60 % Al. These alloys further comprise at least one additional element selected from the group consisting of Sc, Y, Ti, Zr, Hf, V, Nb, Ta and the lanthanides.

20 Fiber diameter, amount of fiber in weight per square meter and porosity are determined in function of :

- 25
- 1) the filter rating so that very fine particulate matter can be captured ;
 - 2) the dirt holding capacity so that the frequency of regeneration can be kept to a minimum.

A typical example of a suitable fiber medium is a fiber diameter of 22 μm and a weight of 1050 g/m².

30 During the regeneration period or cycle the stainless steel fiber web responds very quickly due to its small thermal mass and keeps the regeneration period to a strict minimum. As a consequence, the energy consumption during the regeneration cycle is also kept as small as possible.

- During the regeneration period fuel is provided to the stainless steel fiber web. This fuel is preferably diesel as this is readily available. The diesel is preheated by the heat of the warm air coming from the engine and used as combustion air. By preheating the diesel is vaporized and after ignition beyond the membrane, combustion occurs in radiant mode. So, apart from the soot particulate matter, the only mass which needs heating up is the stainless steel fiber web, which has a low thermal mass due to the small diameter fibers and their great number of mutual contacts. This explains the short regeneration cycles or periods and the low energy consumption.
- Combustion occurs then in radiant mode at the surface of the stainless steel fiber web. So no separate burner is required to heat up the stainless steel fiber web.
- Another phenomenon which helps to reduce the energy consumption is as follows. The combustion of the particulate matter present in the stainless steel fiber web is an exothermic reaction, which, once initiated, keeps burning even after gradually reducing the diesel input.
- According to an advantageous embodiment of the present invention, the method comprises the step of monitoring the pressure drop across the porous membrane during the filtration period. As particulate matter is building up at the surface of said membrane and in the membrane, this pressure drop increases during filtration. Once the pressure drop across the membrane reaches the threshold, which is checked automatically using a pressure gauge, the filtration period or cycle stops and the regeneration period or cycle starts.

Brief description of the drawings.

The invention will now be described into more detail with reference to the accompanying drawings wherein

- 5 - FIGURE 1 schematically shows the functioning of a diesel exhaust particulate filter system according to the second aspect of the invention.

Description of the preferred embodiments of the invention.

10 FIGURE 1 schematically shows the functioning of a diesel exhaust particulate filter system 10 according to the second aspect of the invention, where filtration and regeneration may occur in parallel.

- 15 The diesel exhaust particulate filter system comprises at least two modules 12, 14 which are placed in parallel. Each module 12, 14 comprises a stainless steel fiber web 16, 18. This stainless steel fiber web is present in the form of a cylinder. Other forms, such as planar strips, are also possible. The diesel exhaust gases are guided via pipe 20 which at its end splits up into two separate inlet pipes 22, 24 leading
- 20 resp. to module 12 and module 14. Valve 26 in inlet pipe 22 and valve 28 in inlet pipe 24 control the flow of the exhaust gases. The diesel fuel can be injected via inlet pipe 30 to module 12 and via inlet pipe 32 to module 14. Valve 34 in inlet pipe 30 and valve 36 in inlet pipe 32 control the flow of the diesel fuel. Exit pipes 38 and 40, resp. for modules 12
- 25 and 14, guide the filtered exhaust gases away from the diesel engine. Exit pipes 42 and 44, resp. for modules 12 and 14, guide the burner gases away from the diesel engine. Valves 46, 47, 48 and 49 control the flow.

-6-

In the situation as shown in FIGURE 1, module 12 functions as filter whereas module 14 is being regenerated. Valve 28 is in a closed position and thus prevents the exhaust gases 50 from flowing to module 14. Valve 26 is in open position and allows the exhaust gases 50 to
5 module 12. Valve 34 is in closed position, so no diesel is injected into module 12. The flow of exhaust gases 50 is radially inwards in the stainless steel fiber web cylinder 16 (as pointed out by the arrows). As particulate matter is building up at the radially outer surface of the steel fiber web cylinder 16, the pressure drop over the steel fiber web
10 increases. This pressure drop is sensed by means of a pressure gauge which is positioned downstream (not shown). Once a predetermined critical level is passed, signals are given to the respective valves to have module 12 operated in regeneration mode and module 14 in filter mode.

15 The filtered exhaust gases are axially guided away from the diesel engine via exit pipe 38 and valve.

In the meantime, valve 36 is in open position and allows diesel to be injected into module 14. The diesel fuel 52 is heated by the present warm air coming from the engine and is ignited. Any particulate matter
20 present on stainless steel fiber web 18 is burned away and the thus created exhaust gases 54 are led away via valve 47 and exit pipe 44. A flame is only present on the surface of steel fiber web 18. No flames are present in the various pipes.

25 The diesel exhaust particulate filter system can be mounted on diesel motors for vehicles as well as for diesel motors functioning outside vehicles such as in stand-alone electrical generation systems.

CLAIMS

- 5 1) A method of regenerating a filter of a diesel exhaust particulate filter system, said method comprising as steps :
- a) providing a porous membrane ;
 - b) using said membrane as filter during a filtration period ;
 - c) using said membrane as a surface combustion burner membrane during a regeneration period following said filtration period.
- 10 2) A method of regenerating a diesel exhaust particulate filter system
- a) providing at least two porous membranes ;
 - b) using at least one of said membranes as filter during a filtration period ;
 - 15 c) using at least one of the remaining membranes as a surface combustion burner membrane during a regeneration period which overlaps with said filtration period.
- 20 3) A method according to claim 1 or 2, wherein said membrane is a stainless steel fiber web.
- 4) A method according to any of the preceding claims, said method comprising the step of providing fuel to said membrane during the regeneration period.
- 25 5) A method according to claim 4 wherein said fluid fuel is diesel.
- 6) A method according to any of the preceding claims,
said method further comprising the step of :
- 30 - monitoring the pressure across said membrane during the filtration period.

7. A method according to claim 6, said method further comprising the step of :

- generating a control signal to regenerate said membrane, once the pressure across said membrane exceeds a predetermined level.

8. A method according to claim 4 wherein during said regeneration period the amount of fuel provided is reduced after initiation of a flame at said porous membranes.



DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I HEREBY DECLARE:

THAT my residence, post office address, and citizenship are as stated below next to my name;

THAT I believe I am the original, first, and sole inventor (if only one inventor is named below) or an original, first, and joint inventor (if plural inventors are named below or in an attached Declaration) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DIESEL EXHAUST PARTICULATE FILTER SYSTEM

(Attorney Docket No. 016782-0244)

the specification of which (check one)

 is attached hereto.

 X

was filed on July 31, 2000 as United States Application Number or PCT International Application Number PCT/EP00/07420 and was amended on _____ (if applicable).

THAT I do not know and do not believe that the same invention was ever known or used by others in the United States of America, or was patented or described in any printed publication in any country, before I (we) invented it;

THAT I do not know and do not believe that the same invention was patented or described in any printed publication in any country, or in public use or on sale in the United States of America, for more than one year prior to the filing date of this United States application;

THAT I do not know and do not believe that the same invention was first patented or made the subject of an inventor's certificate that issued in any country foreign to the United States of America before the filing date of this United States application if the foreign application was filed by me (us), or by my (our) legal representatives or assigns, more than twelve months (six months for design patents) prior to the filing date of this United States application;

THAT I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment specifically referred to above;

THAT I believe that the above-identified specification contains a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention, and sets forth the best mode contemplated by me of carrying out the invention; and

THAT I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

Atty. Dkt. No. 016782-0244

I HEREBY CLAIM foreign priority benefits under Title 35, United States Code §119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number	Country	Foreign Filing Date	Priority Claimed?	Certified Copy Attached?
99202673.2	Europe	August 19, 1999	YES	

I HEREBY CLAIM the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

U.S. Provisional Application Number	Filing Date

I HEREBY CLAIM the benefit under Title 35, United States Code, §120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Application Number	Parent Filing Date	Parent Patent Number

I HEREBY APPOINT the following registered attorneys and agents of the law firm of FOLEY & LARDNER:

STEPHEN A. BENT	Reg. No. 29,768
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Atty. Dkt. No. 016782-0244

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RICHARD L. SCHWAAB	Reg. No. 25,479
MICHELE M. SIMKIN	Reg. No. 34,717
HAROLD C. WEGNER	Reg. No. 25,258

to have full power to prosecute this application and any continuations, divisions, reissues, and reexaminations thereof, to receive the patent, and to transact all business in the United States Patent and Trademark Office connected therewith.

I request that all correspondence be directed to:

Glenn Law
FOLEY & LARDNER
Customer Number: 22428



22428

PATENT TRADEMARK OFFICE

Telephone: (202) 672-5426
Facsimile: (202) 672-5399

I UNDERSTAND AND AGREE THAT the foregoing attorneys and agents appointed by me to prosecute this application do not personally represent me or my legal interests, but instead represent the interests of the legal owner(s) of the invention described in this application.

I FURTHER DECLARE THAT all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Name of first inventor

Willy MARRECAU

Residence

Rome, Georgia

Citizenship

USA

Post Office Address

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Rome, Georgia 30165

Inventor's signature

Willy Marrecau

Date

11/02/02